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ABSTRACT

Generalizations arising from effective teaching studies are vulnerable because they are not based on a theoretical perspective of how learning occurs or can be improved, but have resulted from observations of what teachers appear to be doing when students are learning. Critics of teacher effectiveness studies contend that good instruction requires more than use of management techniques and provision of opportunities for learning; it should be grounded in theoretical perspectives and reflect awareness of the interactive nature of the teaching situation. A framework, based upon research studies on cognition, is offered for designing research in teaching and interpreting the teacher's role in coordinating learning variables. The framework is based on the assumption that teachers make instructional decisions founded upon knowledge of four features: (1) content to be taught; (2) student diversity and differing skill levels; (3) learning activities; and (4) methods of measuring learning. The excellent teacher reflects upon, plans, and alters instruction depending upon interactions among these factors. Selected studies demonstrating two- or three-way interactions between these factors are described and analyzed. (JD)

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A NEW DIRECTION IN EDUCATION: A FRAMEWORK FOR DESIGNING AND INTERPRETING RESEARCH IN EXCELLENCE IN TEACHING

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A New Direction in Education: A Framework for Designing and Interpreting Research in Excellence in Teaching

Recent teacher effectiveness research has received serious and frequent consideration. Reports of these investigations stress that effective teachers employ well designed routines which keep students on task and diminish lost time. Specifically, effective teachers employ monitoring and reactive--corrective behaviors which insure high pupil engagement rates.

Roehler and Duffy (1981) summarize the research in these two statements:

1. The most effective teachers of basic skills generate the greatest engaged time on task by using direct instruction and management techniques.

2. Such teachers look more like technicians than reflective professionals because of the way they use instructional materials to maintain the activity flow which insures maximum engaged time and minimum pupil disruptions. (p. 7)

Although most teacher effectiveness research has been conducted in elementary grades and in basic skills, Rosenshine (1983) generalized the findings and has suggested that "these teaching functions form a general model of effective instruction" (p. 336). Presumably, effective teachers are successful because their classroom management practices and procedures insure that pupils are engaged in instructional activities for long periods of time, and as such, their students have

greater opportunity to learn than do those pupils whose teachers do not employ well designed monitoring and management routines.

Several teacher educators and researchers have been troubled by the limitations of teacher effectiveness studies. For one thing, the research has been criticized because successful teachers are portrayed more as technicians skilled in organizing student time on task than as professionals who are cognizant of an array of learning variables about which they make decisions as they plan and deliver instruction. Likewise, there appears to be growing pressure for teachers to function as classroom managers rather than instructors. However, naturalistic observation studies of classrooms have also revealed that instruction in the form of careful elaboration of concepts is the most problematic aspect of a teacher's classroom performance. For example, Good's (1983) assessment of mathematics instruction is that teachers' problems occur more frequently in the development stage of the lesson, i.e., in the presentation of mathematical principles, than they do in other areas.

In effect, the generalizations from effective teaching studies imply that the demands of teaching place a burden on the teacher which leave little room for reflective instructional behavior. Hence, in effectiveness research, the teacher acts in the capacity of a functionary who arranges

and coordinates tasks and who keeps students appropriately occupied in instructional activities. The representation of a manager efficiently directing a worker in a production line seems apt in describing the teacher's role in a classroom from the perspective of "effective teaching."

This focus upon management behavior to the exclusion of the thinking and reflective activity of teaching constitutes a strong bifurcation of thought and action. Effective teaching research concentrates exclusively on the behavior directly accessible to observation and ignores the question, "Why does the teacher engage in particular activities?" This is a serious oversight since as Fenstermacher (1979) argues, human behavior is driven to some degree by active reasoning. What is more, Shulman and Lanier (1977) argue that the thinking dimension of teaching is a central one and the researcher must be attentive to the mental life of the teacher.

> How teachers behave and what they do is directed in no small way by what they think. It is the relationship between thought and action that becomes the critical issue in research on teaching. (p. 44)

Critics of the teacher effectiveness studies and the constricted view of teaching which has arisen from them have also noted the atheoretical nature of the investigations. Effectiveness studies were prompted, in part, by a dissatisfaction with prior research which had been conducted in laboratory settings and by a desire to understanding

teaching as it actually occurred in the classroom. As Good (1983) suggests this atheoretical approach was probably merited.

> Given the paucity of information about classroom practice that existed in the late 1960's, the attempt to gain normative information about classroom practice using atheoretical approaches was probably useful. (p. 64)

Nevertheless, generalizations arising from effective teaching studies are highly vulnerable because they are not based on a theoretical perspective of how learning occurs or can be improved but have instead resulted from empirical observations of what teachers appear to be doing when students are learning. Ausubel (1968) affirms the importance of theory, "It is largely from a theory of learning that we can develop defensible notions of how crucial factors in the learning-teaching situation can be more effectively manipulated" (p. 13).

Simply put, the recommendations arising from the teacher effectiveness research are not based either on an understanding of the major variables involved in the teaching-learning process or on a perspective of what constitutes good instruction. Advocating teaching practice which is not grounded in a theoretical perspective tends to encourage procedure oriented teachers who are unable to cope with change and new circumstances.

Good (1979) further points out the lack of explanatory power of teaching effectiveness studies when commenting

on the Missouri Mathematics Program, a teacher effectiveness study for which he was a coinvestigator. He noted that:

> We have evidence that the Missouri Mathematics Program in general had a positive impact upon the mean performance of students in experimental classrooms, but we have no data to explain why the program worked. (p. 64)

Fenstermacher (1979) cogently expressed the dilemma inherent in attempting to establish standards for teaching by observing and recording teacher behavior:

> The study of teachers, as social and behavioral scientists typically do it, tells us little about the worth or value of what the teacher does. Studying teachers in order to learn or augment skills naively presupposes the worth of the performances observed, without conscious consideration of whether the performances are worthwhile or worthless. Judgments of worth require a normative point of view, a theory of what it is rationally and morally justificable for a teacher to do. (p. 63)

A final criticism of teaching effectiveness research comes from those who contend that teaching is a much more complicated and contextually determined phenomena than is revealed by the generalizations of effective teaching investigations. Even the most cursory survey of the literature in teaching discloses that research of teaching ought to be beyond the stage of suggesting simple laws or check lists. Excellent teaching performance varies according to (1) characteristics of students being taught, (2) the means by which their learning is measured, (3) the learning activities of both teachers and students and (4) the curriculum.

Furthermore, instead of strong, simple relationships between the four factors, the factors interact vigorously with each other.

In short, critics of teacher effective studies contend that good instruction requires more than the utilization of management techniques and the provision of an opportunity for students to learn, should be grounded in theoretical perspectives and should reflect an awareness of the interactive nature of the factors involved in any teaching situation.

In an effort to reveal a more comprehensive understanding of the teacher's role in supplying excellent instruction, I would like to recommend a framework which might assist in designing research in teaching and also might provide a framework for interpreting the teacher's role in coordinating learning variables.

The framework is suggested tentatively because there are a vast number of studies and strands of research in teaching and it may be that the framework is not sufficiently comprehensive so as to fit many areas of research into the scheme. It appears to be a place to begin, however. Use of the framework in stimulating and structuring teaching research might possibly lead to the development of a functional model of teaching which is suited to the complex phenomena of classroom teaching. Consideration of the framework might be seen as the first step in

providing a paradigm along the lines of a scientific paradigm, defined by Kuhn (1970) as a theoretical framework, or a way of perceiving and understanding the world that a group of scientists has adopted as their world view.

Tuthill and Ashton (1983) argue the importance of such a paradigm:

> In order for science to progress in education, it is essential that educational scientists and practitioners work together, as members of the same paradigmatic communities, solving the same paradigmatic puzzles. (p. 9)

That there exists a need for such a framework was also argued by Nuthall and Snook (1973) in a review of contemporary models of teaching. The shortcomings of current models, such as behavior modification and discovery learning, are alleged in the following extracts from the review:

> Unlike major models which have been influential in the physical sciences, these models do not compete with each other as alternative views of the same body of established data. Since there is little, if any, established data about teaching which is widely accepted, they compete with each other as alternative ways of viewing the practical activity of teaching. (p. 49)

> If there is any single characteristic which defines these models, it is that they each have, at their center, an assumption that all significant variation in teaching is a function of variation along a single dimension. This assumption makes it possible for an investigator to see questions about teaching methods as evaluative "either...or" questions. (p. 49)

The proposed framework might encourage multiple dimension views of good teaching and provide a structure within which opposing views of the same data can be scrutinized.

The framework is simple, context sensitive and appropriated from researchers in memory and cognition. A brief

history of the model will be presented with acknowledgement to its creator and adaptor and then possible implications and advantages of the model for providing a new direction for research in excellence in teaching will be suggested. A discussion of how the framework might provide a more sensitive and appropriate means for viewing teacher performance than does time management view of teacher effective research will also be examined. (See Figure 1.)

Initially, Jenkins (1978) used the model to present the findings of memory research. Jenkins was concerned with providing a contextual view of the processes involved in human memory. He recognized that no one rule or primary law would portray the important variables in memory research and he suggested that a simple model might serve to "keep the variables in some order and to remind myself that even the variables I am currently neglecting have their effects" (p. 431)

He suggested that researchers have a favorite vertex when exploring issues in memory. For example,

> The vertex marked orienting tasks is the favored home of students of incidental learning and the levels-of-processing theorists. They are generally content to alter tasks and ask what the effects are on some fixed criterial task. They rarely change subjects, and they are likely to stick with one kind of material.
>
> Investigators who are intrigued with materials are likely these days to study words and pictures, running parallel experiments and reporting on the differences observed as they change from one kind of material to another. Alternatively, they may be educational researchers who are concerned with what kind of

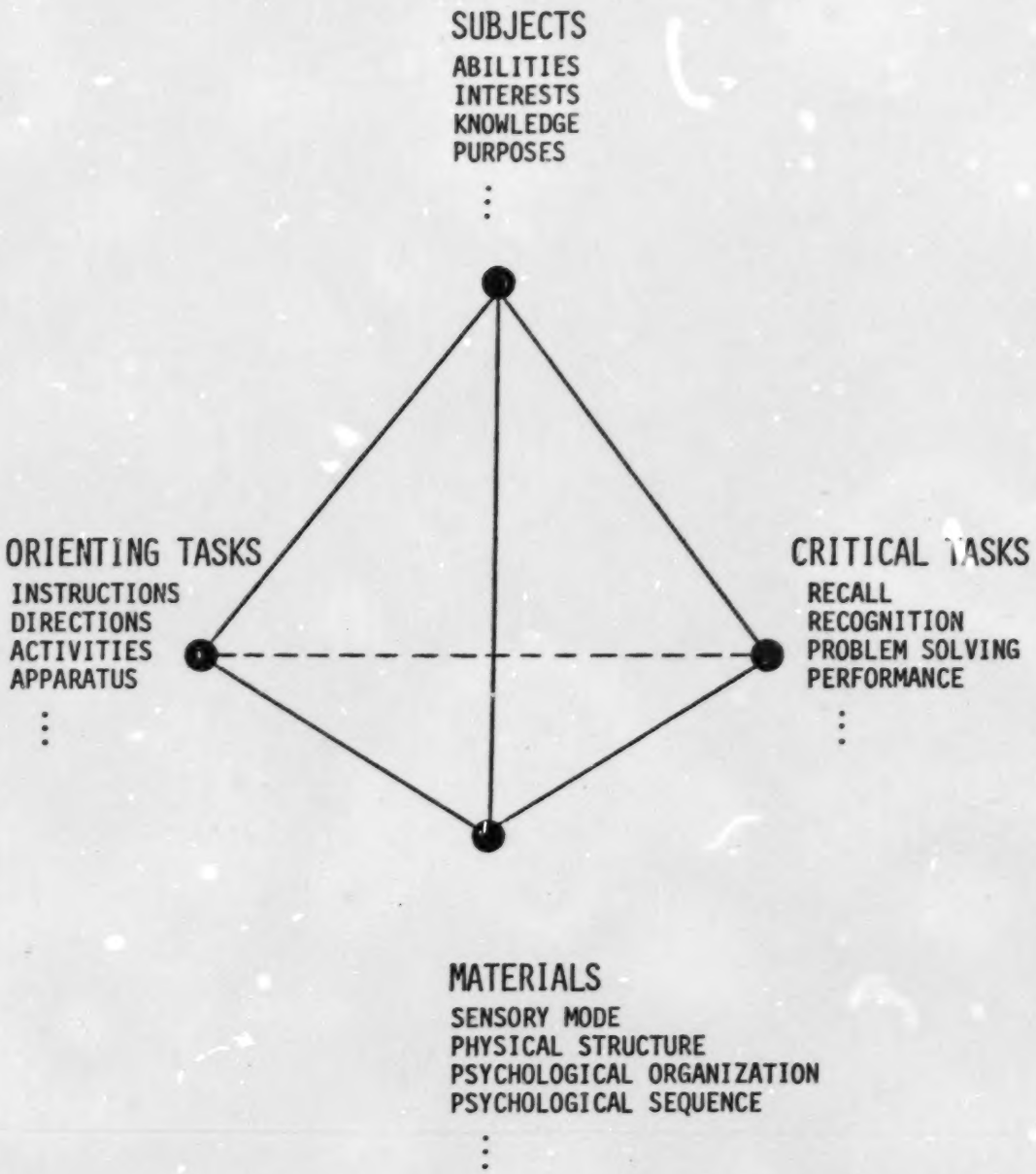

Figure 1. The Problem Pyramid or Theorist's Tetrahedron. Each vertex represents a cluster of variables of a given type. Each edge represents a two-way interaction important to learning and memory. Each plane calls attention to a three-way interaction, and the whole figure represents the four-way interaction of all the variables. (Jenkins, 1978)

material to present as well as its structure and organization over time.

Other investigators may be concerned with subjects. They may be interested in children versus adults, or educationally disadvantaged children versus normal children, or subjects with a high degree of skill (for instance, in chess) versus novices.

In most cases, the investigator is likely to deal with a single paradigm of acquisition, a fixed body of material, and a single dependent measure.

Finally, a few workers are interested in the criterial tasks. Such investigators may be concerned with the traditional relationship between recall and recognition, or between memory and problem solving, or the relation between cued versus free recall, or between immediate and delayed measurement of what is learned. (pp. 431-432)

Jenkins (1978) summarized his discussion of memory research by concluding that "The phenomena of learning and memory that we observe are increasingly seen to be dependent on the nature of our subjects, our orienting tasks, the kinds of materials we work with, and the critical tasks we employ" (p. 431).

The model was next adapted by Bransford (1979) and was used to provide a framework for writing a text on cognition so that the relationships between basic research and applications of that research might be made understandable for undergraduate psychology students. The model was presented so that a number of interactive elements, relative to human cognition could be portrayed. (See Figure 2.)

Bransford explains the utility of the organizational framework in conceptualizing issues in learning in the following excerpt:

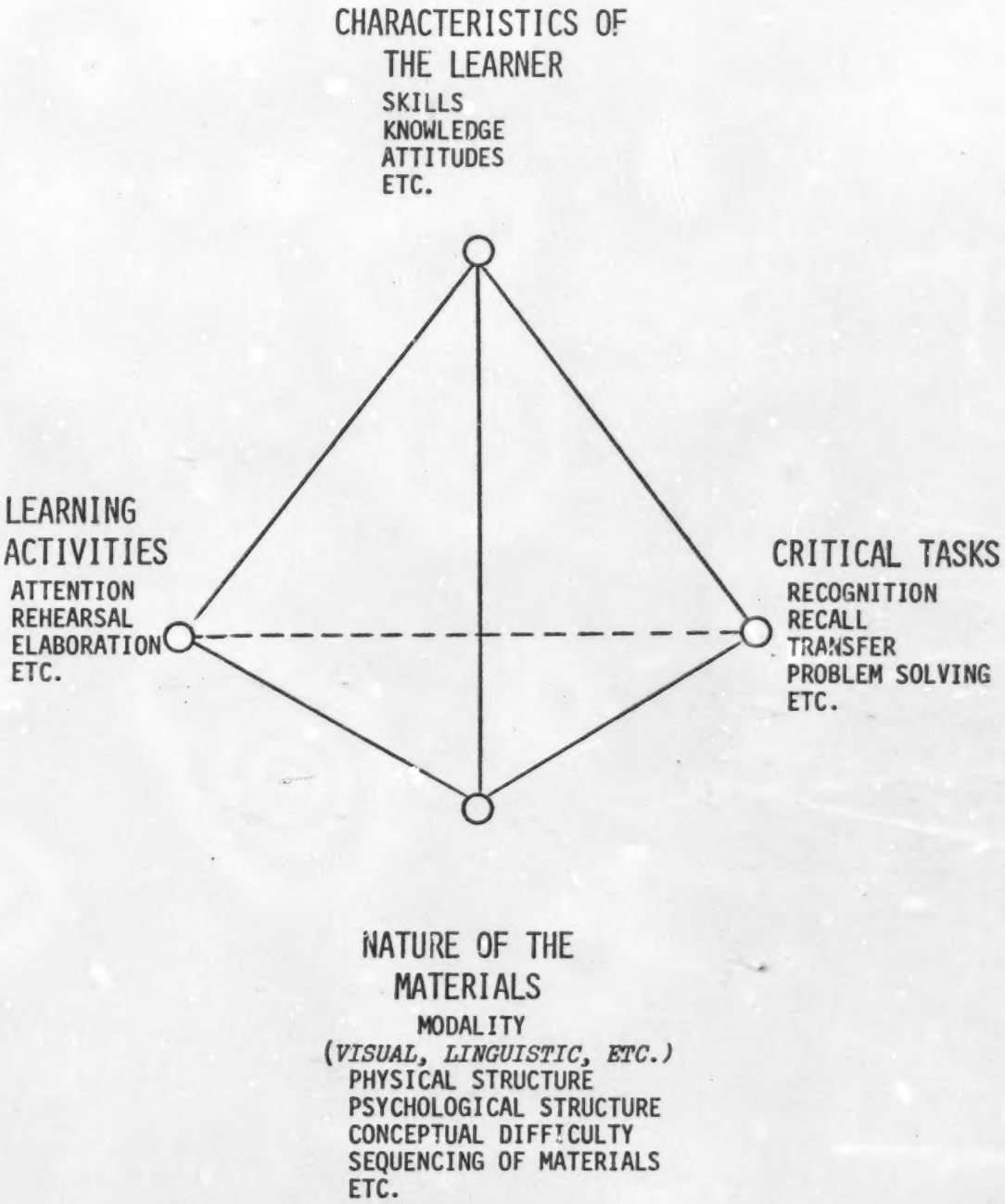

Figure 2. An Organizational Framework for Exploring Questions about Learning, Understanding, and Remembering. (Adapted from Jenkins, 1978. Used by permission.) (Bransford, 1979)

> Note first that the diagram . . . illustrates four basic factors that we must consider when evaluating questions about learning, understanding, and remembering. These include
>
> 1. The nature of the materials to be learned.
>
> 2. The characteristics of the learner--his or her current knowledge, skills, attitudes.
>
> 3. The learning activities, or the kinds of things that learners do when presented with material--do they, for example, attend to the information, rehearse the information?
>
> 4. The critical tasks, or the kinds of test tasks used to evaluate the degree of learning--for example, we may ask people to remember a previously defined concept, to demonstrate that they can use that concept to solve a new problem, and so forth. (p. 7)

Bransford suggests that the framework "illustrates a complex set of relationships among factors that must always be kept in mind when exploring questions about learning, understanding and remembering" (p. 9).

Adjusted to the purposes for which I have suggested it, the model looks like the following and is the TASC Framework for Designing and Interpreting Research in Excellence in Teaching. The poles of the tetrahydral model have been relabeled with conventional educational terminology. (See Figure 3.)

The framework permits content, students, activities and testing variables to be studied with respect to the teacher's cognizance of and estimation of the importance of those variables for instruction. Major significant aspects of the instructional process and their interactions are thereby incorporated into a research design. Classroom teachers make

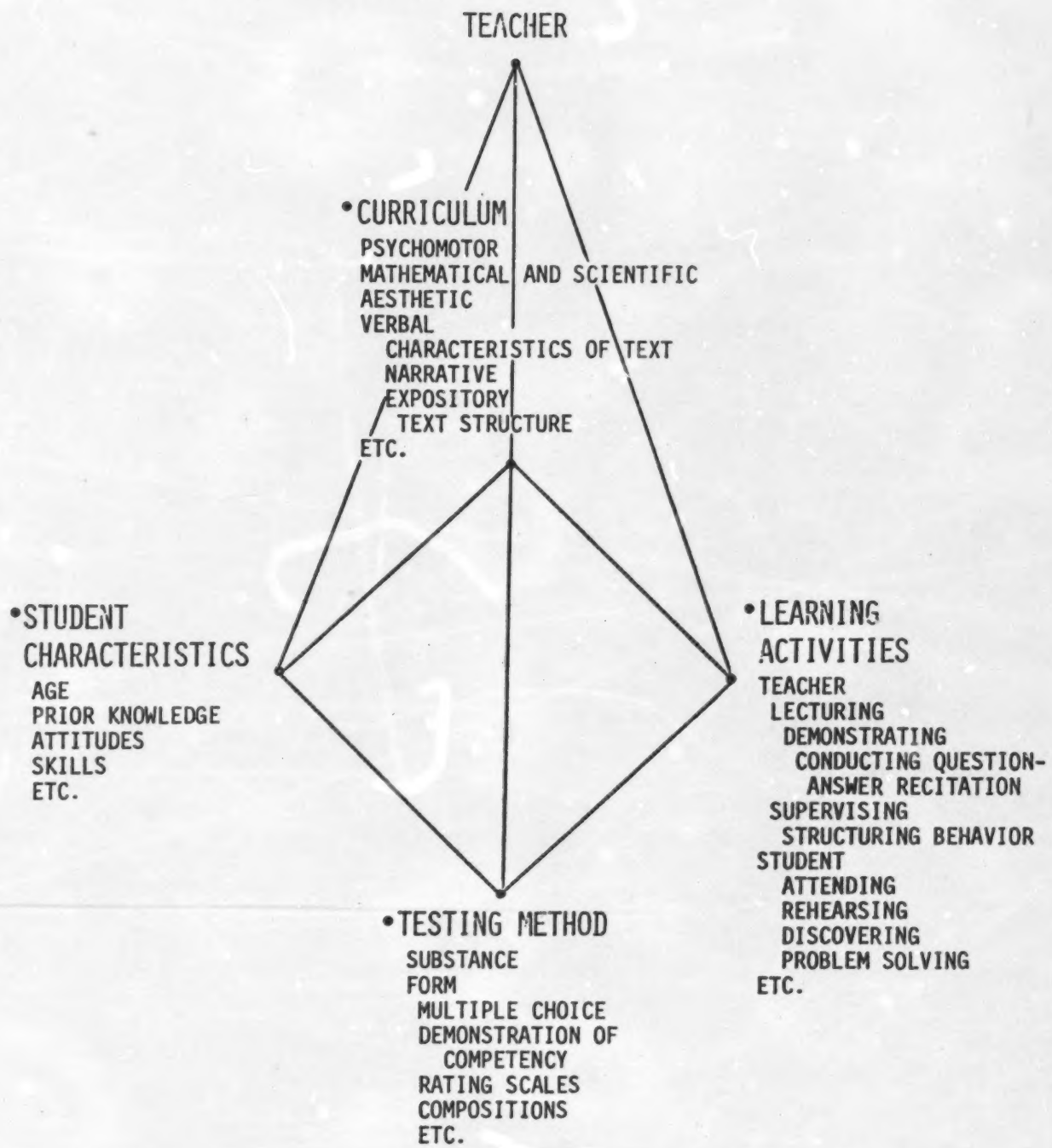

Figure 3. TASC Framework for Designing and Interpreting Research in Excellence in Teaching.

instructional decisions founded upon knowledge of four features: (1) the content to be taught, (2) students with varying degrees and depth of knowledge, as well as skills with respect to the subject matter, (3) learning activities and (4) method of measuring learning.

TASC is offered as a context sensitive classification system for viewing research in the field of teaching. Any research effort is influenced by all aspects of the framework, whether their influence is explicitly acknowledged or not. Because of the complexity of the teaching phenomena, the possibility of drawing incorrect conclusions becomes especially likely when we attempt to generalize. The framework permits a way of examining and comparing a range of investigations and for reminding ourselves of the factors which were and were not explored in a particular investigation or set of investigations.

An investigation is focused upon one or two of the major factors represented in the framework. Take for instance, the curriculum factor. Curriculum identifies what is taught. Curriculum amounts to the selection and organization of a body of knowledge, skills, and/or understandings. A crude categorization of types of curriculum would consist of psychomotor, mathematical and scientific, aesthetic, and verbal. Further differentiation of curriculum can be made. For instance, verbal curriculum can be categorized according to characteristics of text and text according to expository

and narrative. One feature of expository text is text structure.

The second vertex of the framework is the student, or subject, variable. There has been an intensified interest in student variables. Among the dimensions upon which students vary are age, prior knowledge of curriculum, skills and attitudes. The increased interest in student variables is, in part, due to prose learning studies in which the role of mediating responses by learners to promote learning has been emphasized. This focus upon the mediating role of the learner places the student in an active capacity so far as acquiring information and skills. The view is that students do not simply stand between curriculum and tests as passive recipients of stimuli. If the goal is to improve student achievement, then it is essential to look at what students do in order to learn.

The third major factor is learning activities. This factor includes both teacher and student activities which promote learning. Teacher activities include such procedures as lecturing, demonstrating, giving examples, conducting question-answer types of recitation and supervising students

engaged in individual seat or laboratory work. Other teacher activities, generally classified as managerial are structuring and organizing the behavior of students. Student activities include attending by listening or reading, elaborating on concepts presented, rehearsing in order to remember, and discovery and problem solving undertakings.

Finally, the method of testing for learning is a major feature pertinent to investigation of the phenomena of teaching. Of relevance here are both the form and the substance of the assessment. Traditional forms for assessing learning include multiple choice tests of both a standardized and informal nature, demonstration of competency such as reading inventories, rating scales in the performing arts and compositions, in the manner of essay exams or themes.

For several reasons, it seems fitting that a model borrowed from cognitive research might enable educators to thoroughly examine issues in excellence in teaching. Implications of the findings of cognitive research are very promising with regard to conditions which facilitate learning in school settings. Within the field of cognitive research there has been a shift in emphasis away from associationism and its concern with manipulation of the circumstances of learning and a concurrent shift toward an emphasis upon the active role of learners. Research in cognition has produced insights which are much more relevant to education than previous psychological research which dealt with a

primary data base derived from rats and pigeons, learning arbitrary things in arbitrary situations. There has been a parallel shift away from the accumulation of facts and their reinforcement histories, to an examination of the organization of information and the active nature of the learner. Bransford (1979) noted that in the 70's, emphasis in cognitive investigations shifted from improving learning by increasing the number, immediacy and/or quality of the reinforcement to improving learning by changing the learner's skills, knowledge and strategies.

A second reason for exploring the model which has emerged from cognitive psychology is that the major goal of cognitive science (comprised of the fields of psychology, artificial intelligence, computer science, linguistics) is to formulate and test theories of the processes that underlie people's abilities to learn, understand and remember information. Cognitive scientists are in pursuit of a theory of learning. The relevance of learning theory to teaching is aptly stated by Bruner (1966) "teaching theory should be concerned with how and what one wishes to teach can best be learned". (p. 40) The abundance of new knowledge relative to cognition suggests that cognitive research might provide a theoretical basis for what Pai (1973) has described as "The development of a more consistent, rationally justifiable, and empirically sound theory of teaching" (p. 2). I am advocating that questions regarding excellence in teaching might be researched within this framework

because it allows for inclusion of variables suggested by both research in teaching practices and cognition.

In some ways, the "effective teaching research" phenomena arose from a defensive posture by educators after Coleman (1966) and Jencks (1972) reported that school resources (money, personnel, organization, and time) have little effect at all on the learning of children. In an effort to collect evidence which would contradict Coleman's conclusions, efforts were undertaken to find both schools and teachers which did have an effect on achievement. I suggest that we begin instead with the confident premise that teaching makes a difference in students' learning and that we replace the concept of "effective teaching" with the concept of "excellence in teaching." Conceptually then, an excellent teacher is aware that many factors impinge upon instruction and thinks about, reflects upon, plans and alters the course of instruction depending upon interactions between these factors.

Let us examine a few of the interactions that might occur during the process of designing and conducting teaching research. There are a vast number of studies in teaching and many of them could be used to demonstrate two way or three way interactions. I have selected several studies, primarily in the teaching of reading, and will show how two way interactions are accounted for within the framework.

Activity and Method of Testing Interaction

A number of studies have tested the efficacy of teachers preparing questions for students to examine before they read an assigned text. A qualified claim that prequestions have a beneficial effect upon learning has been empirically supported. Anderson and Biddle (1975) suggest with respect to learning from prose, prequestions can have a facilitative effect if the goal of the question is to have students learn only the information from reading that which is necessary to answer the pretest question. That is, it appears that prequestions serve to direct students' attention to selected issues and if those issues are the ones targeted for acquisition, then the activity is useful. If learning of broader ideas is intended, then the questions are not helpful in promoting that learning. In this case, the activity interacts with method of testing for learning to produce either a facilitative or a noneffective result.

Activity and Subjects Interaction

Ausubel (1968) proposed the use of advanced organizers as an activity which would close the gap between information to be learned and the learner's prior knowledge of the subject. The function of advanced organizers is to provide a general conceptual scheme into which the reader can fit the more specific information in the text. Many researchers have found evidence for the value of advanced organizers, but others

have fai ed to find such advantages. An advanced organizer should be useful only if it prepares people to learn information that they could not easily have learned otherwise. If an organizer is consistent with the reader's skill and knowledge, then it would not be necessary and would not be effective in promoting learning. Hence, there is an interaction between prior knowledge of the subject and the learning activity. Hence, the advantage of the organizer is dependent upon the subjects' base of information as it relates to the textual information.

Activity and Curriculum Interaction

For the most part, effective teaching studies (Roehler & Duffy, 1981) have been concerned with the teaching basic skills in reading and math. An expressed concern is that by encouraging the utilization of activities which seem appropriate in teaching of basic skills, we are systematically misteaching for higher order cognitive processes. Goodlad (1984) reports, for instance, that, "We found topics (magnets and batteries) and not concepts (energy) highlighted in grade specific courses of study, reinforced in textbooks, and workbooks, and further broken down into facts to be acquired for quizzes" (p. 221). The atomization of information and skills into the smallest possible unit of instruction is appropriate and useful in some, but not all, types of curriculum. For example, teaching irreducible units of information may not be

appropriate or effective when teaching concepts or for helpful students to evaluate, apply and generate knowledge. In this instance, I am suggested a possible interaction and not one that has been empirically demonstrated.

Curriculum and Subjects Interaction

Meyer (1975, 1977) and Kintsch (1974, 1977) have developed methods for analyzing the structure of information in texts. Their systems of text analysis reveal the degree to which particular ideas are central or more peripheral to the main theme of a passage. The analyses assign propositions to various levels in the text-based hierarchy. Those propositions that are more central to the theme of the text are assigned a higher rank in the hierarchy. Meyer (1975, 1977), Kintsch (1974, 1977), Duchastel (1979), and Pemberton (Note 1) report that the higher the level of proposition, the greater the probability of recalling the idea. Kintsch and Yarbrough (1982) suggest that proficient readers use the text structure to form a scaffolding to which meaning is attached as they read.

> What we are assuming is that the student calls up a rhetorical schema (overall organization of the text) . . . and uses it to organize the paragraph around it. (p. 829)

Meyer (1975) recommends that students be taught text structures such as definition, argument, comparison and contrast, and procedural descriptions. She contends that:

> It seems likely that the reader who actively searches for relations among the items discussed in the passage, and consciously attempts to identify the structure, will have a cognitive structure of the passage's contents following reading which will better support recall, and result in less forgetting. (p. 119)

However, there is evidence that the text structure characteristic of curriculum interacts with subjects' prior knowledge in a learning context. For instance, in an investigation which I conducted, although there was greater likelihood of information being recalled when it was embedded high in the structure of a passage, it also appears that prior knowledge had a greater effect upon recall than did text structure. In the study, the participants were graduate students in education, many of whom were doctoral students in counseling. A much higher recall of ideas from passages dealing with psychological illness than from passages about nuclear reactors was revealed. The findings suggest that the usefulness of text structure to the reader is effected by the reader's depth of information in regard to the textual subject matter.

The framework permits investigators to examine the ways in which quality instruction entails attention to four major factors. It is suggested that excellent teachers think about how to create learning environments through an awareness of and attention to the interactions of these components related to learning. Utilization of the model for teacher education might assist us in one of the problems

in relating research findings to educational practice. The problem is that a commonly held view is that both theory and research can provide teachers with rules to follow. The assumption appears to be that research findings from psychology can provide prescriptions for classroom practice.

In the search for the best recipe, the teacher's own problem-solving responsibility is undermined. Whereas research studies can provide practices and procedures which have merit in a particular setting, only practitioners can evaluate the ecological validity of the practice within the particular circumstances wherein they teach. As a vehicle for emphasizing the teacher's decision-making function in the teacher-learning situation, the model is compelling because it acknowledges the professional contribution which a teacher provides to the instructional process.

Perhaps the TASC framework will assist us in implementing William James (1904, 1958) admonition:

> You make a great, a very great mistake if you think that psychology, being the science of the mind's laws, is something from which you can deduce definite programs and schemes and methods of instruction for immediate classroom use. Psychology is a science, and teaching is an art; and sciences never generate arts directly out of themselves. An intermediary inventive mind must make the application by using its originality. (pp. 23-34)

If, as suggested, the model depicts the interconnectedness of the major variables in teaching-learning circumstances, an excellent teacher would be characterized as cognizant of

multiple factors and accounting for their influence in specific classroom conditions. Such a teacher attempts to improve students' learning and intervenes when progress in learning is problematic. With respect to the model, the teacher's role in teaching-learning is central to the qualitative and rational decisions which are required for learning to progress. The proposed conception of an excellent teacher is antithetical to the view of teachers as technicians, around whom curriculum must be designed to insure that it is "teacher-proof."

The theme of this paper may be characterized as the context sensitivity of teaching. Jenkins (1979) warned in regard to memory research, "The generalizations that we have all been trying to establish have proved to be highly vulnerable when they are tested trans situationally" (pp. 443-444). Jenkins' qualifying statement about memory research seems an equally apt caveat with regard to teaching research, i.e., the generalizations that educational researchers have been trying to establish about what constitutes excellent teaching have proved to be highly vulnerable when they are examined trans situationally.

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